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DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL, GAS AND MINING

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DOGM
MINERALS PROGRAM
FILE COPY

October 3, 1990

TO: Wayne Hedberg, Permit Supervisor

FROM: Tony Gallegos, Reclamation Engineer *adg*

RE: Redmond Clay and Salt Company Plan Review, M/039/002, Sanpete County, Utah

No real plan has been submitted by Redmond at this time. I have arrived at what I would consider a rough reclamation estimate, from reviewing my field notes, photographs and the latest maps supplied by Redmond.

The estimate includes revegetation suggestions made by Holland, although due to his absence he has not had the opportunity to review it. The estimate does not include treatment of the disturbances designated by the operator as "old", taking this to mean pre-law. The estimate does however, include treatment of the clay mining area between the North and South Mining Properties which was included on one of the maps submitted, but not exactly detailed by the operator. This area is shown under the ownership of the Bosshardt Farms and may need to be considered as separate from Redmond Clay and Salt, although this is unclear at this time. I feel we should postpone sending this estimate to the operator until we have had a chance to review/discuss it.

The estimate contains a considerable amount of detail with respect to the assumptions made. Information which would improve the accuracy of the estimate would include the following:

- 1) which roads have a post-mining land use?
- 2) which structures, if any, have a post-mining land use?
- 3) the dimensions and location of each mine portal;
- 4) the highwall dimensions for the entire perimeter of all pits, salt and clay;
- 5) how much pre-law disturbance has been redisturbed by the operator and how much has been left undisturbed;

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Redmond Clay and Salt
M/039/002
October 3, 1990

- 6) a clearly defined area of disturbance;
- 7) an estimate of the amount of material to remain on waste dumps and piles at the end of the mine life;
- 8) the dimensions and general description of all structures (i.e., concrete floor, reinforced concrete, steel construction, etc);
- 9) identification of those areas to be reseeded;
- 10) locations and dimensions of any/all ponds and established drainages;
- 11) an estimated description of the underground workings at the end of the mine life.

jb
cc: Holland Shepherd
MNM039002.2

RECLAMATION ESTIMATE	PAGE 1 of 5
Redmond Clay and Salt Company	10/01/90
North Mining Property	Sanpete County
M/039/002	
Prepared by Utah State Division of Oil, Gas & Mining	

Reclamation Details – North Mine Property

- Areas designated as Pre-Law by the Division are to be left as is
- Closure of all mine portals by blasting/backfilling for 15 feet inside
- Regrade portal closure to a 2 horizontal: 1 vertical slope (45 degrees)
- ASSUMED: 2 salt mine portals; portal dimensions 65 ft x 40 ft
- ASSUMED: Salt Mine highwalls are 100 ft high for entire pit area
- ASSUMED: Clay Mine highwalls are 60 ft high for entire pit area
- Pit highwalls to be blasted/regraded to a 2:1 slope for entire perimeter
- Pit floors to be Ripped, Mulched, Disked, Fertilized, & Seeded(R-M-D-F-S)
- Waste dumps & piles to be regraded to a 3h:1v slope (18 degrees)
- All waste dumps & piles to be M-D-F-S
- Roads designated by the Division as having a post-mining use to be left as is
- All other roads to have berms removed, be regraded, and be R-M-D-F-S

<u>Description</u>	<u>Amount</u>	<u>\$/Unit</u>	<u>Cost-\$</u>
Blasting 2 portals	3,000 CY	5.55	16,650
Regrading 2 portal closures	2,000 CY	0.25	500
Regrading salt pit highwalls	715 LF	11	7,865
Rip Salt pit floor	0.81 acre	955	774
M-D-F-S Salt pit floor	0.81 acre	1,480	1,199
Regrading clay pit highwalls	4,290 LF	11	47,190
Rip Clay pit floors	4.08 acre	955	3,896
M-D-F-S Clay pit floors	4.08 acre	1,480	6,038
Regrade waste dump	1.39 acre	802	1,115
M-D-F-S Waste dump	1.39 acre	1,480	2,057
Regrade gravel pile	1.57 acre	802	1,259
M-D-F-S Gravel pile	1.57 acre	1,480	2,324
Rip roads & regrade berm	3.44 acre	1,055	3,629
M-D-F-S Roads	3.44 acre	1,480	5,091
	SUBTOTAL		99,587
	+ 10% CONTINGENCY		9,959
	SUBTOTAL		109,546
	+ 5 yr ESCALATION(1.84%)		10,456
NORTH MINING PROPERTY SUBTOTAL IN 1995-\$			\$120,002

RECLAMATION ESTIMATE

PAGE 2 of 5

Redmond Clay and Salt Company

10/01/90

South Mining Property

Sanpete County

M/039/002

Prepared by Utah State Division of Oil, Gas & Mining

Reclamation Details – South Mine Property

- Closure of all mine portals by blasting/backfilling for 15 feet inside
- Regrade portal closure to a 2 horizontal: 1 vertical slope (45 degrees)
- ASSUMED: 4 salt mine portals; portal dimensions 65 ft x 40 ft
- ASSUMED: Salt Mine highwalls are 100 ft high for entire pit area
- Pit highwalls to be blasted/regraded to a 2:1 slope for entire perimeter
- Pit floors to be Ripped, Mulched, Disked, Fertilized, & Seeded(R-M-D-F-S)
- Waste dump & new earth removal area regraded to a 3h:1v slope (18 degrees)
- Waste dump & new earth removal areas to be M-D-F-S
- Yard area (includes facilities area) to be R-M-D-S-F
- ASSUMED: Metal scrap to be buried on mine site and area R-M-D-S-F
- Roads graded & R-M-D-S-F unless a Division designated post-mining use

<u>Description</u>	<u>Amount</u>	<u>\$/Unit</u>	<u>Cost-\$</u>
Blasting 4 portals	6,000 CY	5.55	33,300
Regrading 4 portal closures	4,000 CY	0.25	1,000
Regrading salt pit highwalls	1,925 LF	11	21,175
Rip Salt pit floor	2.06 acre	955	1,967
M-D-F-S Salt pit floor	2.06 acre	1,480	3,049
Regrade Waste dump	1.08 acre	802	866
M-D-F-S Waste dump	1.08 acre	1,480	1,598
Regrade Earth removal area	2.51 acre	802	2,013
M-D-F-S Earth removal area	2.51 acre	1,480	3,715
Rip Yard area	5.20 acre	955	4,966
M-D-S-F Yard area	5.20 acre	1,480	7,696
Bury metal scrap	0.77 acre	1,210	932
Rip Metal Scrap area	0.77 acre	955	735
M-D-S-F Metal Scrap area	0.77 acre	1480	1,140
Rip roads & regrade berm	6.22 acre	1,055	6,562
M-D-F-S Roads	6.22 acre	1,480	9,206
	SUBTOTAL		99,919
	+ 10% CONTINGENCY		9,992
	SUBTOTAL		109,911
	+ 5 yr ESCALATION(1.84%)		10,491
SOUTH MINING PROPERTY SUBTOTAL-A	IN 1995-\$		\$120,402

RECLAMATION ESTIMATE	PAGE 3 of 5
Redmond Clay and Salt Company	10/01/90
South Mining Property	Sanpete County
M/039/002	
Prepared by Utah State Division of Oil, Gas & Mining	
<u>Reclamation Details – South Mine Property --CONTINUED--</u>	
-Pond area to be backfilled/regraded and M-D-S-F	
-ASSUMED: All facilities to be demolished and buried on site; no salvage value	
-ASSUMED: The dimensions shown for each facility listed below	
-Shed 45'x20'x18'; Shop 70'x30'x20'; Primary Crusher 60'x30'x20';	
-Secondary Crusher 60'x30'x20'; Mill 150'x80'x25'; Bulk Storage 150'x140'x25';	
-Scales 75'x20'x15'; Old Compressor House 30'x30'x12': Old Pump	
-House 30'x30'x12': Compressor House 30'x30'x12'; Tank 25' diameter;	
-ASSUMED: Crushers have reinforced concrete; bldgs have concrete floors	
<u>Description</u>	<u>Amount</u> <u>\$/Unit</u> <u>Cost-\$</u>
Backfill/Regrade Pond	0.44 CY 802 353
M-D-S-F Pond area	0.44 CY 1480 651
Demolish Shed	16,200 CF 0.20 3,240
Demolish Shop	42,000 CF 0.20 8,400
Demo. Shop Concrete Floor	233 SY 11.75 2,738
Demo. Primary Crusher	36,000 CF 0.20 7,200
Demo. Crusher Concrete	200 CY 245 49,000
Demo. Secondary Crusher	36,000 CF 0.20 7,200
Demo. Crusher Concrete	200 CY 245 49,000
Demolish Mill	300,000 CF 0.20 60,000
Demo. Mill Concrete Floor	1333 SY 11.75 15,663
Demolish Bulk Storage	525,000 CF 0.20 105,000
Demo. Bulk Storage Floor	2333 SY 9.20 21,464
Demolish Scales	22,500 CF 0.20 4,500
Demo. Old Pump House	10,800 CF 0.20 2,160
Demo. Old Compressor House	10,800 CF 0.20 2,160
Demo. Compressor House	10,800 CF 0.20 2,160
Demolish Tank	1 ea 500 500
SUBTOTAL 341,388	
+ 10% CONTINGENCY 34,139	
SUBTOTAL 375,527	
+ 5 yr ESCALATION(1.84%) 35,843	
SOUTH MINING PROPERTY SUBTOTAL-B	IN 1995-\$ \$411,370

RECLAMATION ESTIMATE

PAGE 4 of 5

Redmond Clay and Salt Company

10/01/90

Clay Mining Property

Sanpete County

M/039/002

Prepared by Utah State Division of Oil, Gas & Mining

Reclamation Details – Clay Mine Property

- ASSUMED: Clay Mine highwalls are 60 ft high for entire pit area
- Pit highwalls to be blasted/regraded to a 2:1 slope for entire perimeter
- Four Pits: (1) 1.17 acre P=1,040'; (2) 2.61 acre P=1,250';
- (3) 1.18 acre P=1,040'; (4) 2.44 acre P=2,080';
- Pit floors to be R-M-D-F-S
- ASSUMED: Clay Pads have an earthen base
- Two Clay Pads: (1) 2.36 acre; (2) 11.16 acre; to be R-M-D-S-F
- Brine Pond to be backfilled/regraded & M-D-S-F
- ASSUMED: Clay Mill to be demolished and debris buried on site
- ASSUMED: Clay Mill dimensions are 250'x100'x20', with a concrete floor
- Roads to be R-M-D-S-F unless Division designated as post-mining use

<u>Description</u>	<u>Amount</u>	<u>\$/Unit</u>	<u>Cost-\$</u>
Regrading clay pit highwalls	5,410 LF	11.00	59,510
Rip Clay pit floors	7.40 acre	955	7,067
M-D-F-S Clay pit floors	7.40 acre	1,480	10,952
Rip Clay Pads	13.52 acre	955	12,912
M-D-S-F Clay Pads	13.52 acre	1480	20,010
Backfill/Regrade Brine Pond	0.69 acre	1210	835
M-D-S-F Brine Pond	0.69 acre	1480	1,021
Demo. Clay Mill	500,000 CF	0.20	100,000
Demo. Clay Mill Floor	2,777 SY	9.20	25,548
Rip roads & regrade berm	8.24 acre	1,055	8,693
M-D-F-S Roads	8.24 acre	1,480	12,195
	SUBTOTAL		258,743
	+ 10% CONTINGENCY		25,874
	SUBTOTAL		284,617
	+ 5 yr ESCALATION(1.84%)		27,166
CLAY MINING PROPERTY SUBTOTAL	IN 1995-\$		\$311,784

RECLAMATION ESTIMATE	PAGE 5 of 5
Redmond Clay and Salt Company	10/01/90
Salt & Clay Mining Properties	Sanpete County
M/039/002	
Prepared by Utah State Division of Oil, Gas & Mining	

***** REFERENCES USED IN CALCULATING THIS ESTIMATE:**

- Means Site Work Cost Data 1990
- Caterpillar Performance Handbook, Edition 18
- Rental Rate Blue Book, 1989 & 1990 sources

Blasting [022-234-0100] <= Means Reference Number
 Mulch [029-516-0350]
 Disking [029-204-6050]
 Seeding [029-308-1600]
 Fertilizing [029-720-0130]
 Building Demolition & Disposal (Burial) [020-604-0500] & [020-604-0100]
 Concrete Demolition, 6" thick, mesh reinforced [020-554-1900]
 Concrete Demolition, 6" thick, rod reinforced [020-554-2000]
 Concrete Demolition, 7-24" thick, reinforced [020-554-2200]

***The following items were calculated by the Division using the

*** Cat Handbook and Bluebook:

Regrading Portal Closures, Highwalls, Dumps, Piles, Ponds
 Ripping Pit Floors, Roads, Pads
 Burying Scrap Metal

SUMMARY OF RECLAMATION COSTS

NORTH MINING PROPERTY SUBTOTAL	\$120,002
SOUTH MINING PROPERTY SUBTOTAL-A	\$120,402
SOUTH MINING PROPERTY SUBTOTAL-B	\$411,370
CLAY MINING PROPERTY SUBTOTAL	\$311,784

TOTAL OF RECLAMATION ESTIMATE	\$963,558
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ROUNDED TOTAL OF RECLAMATION ESTIMATE IN 1995-\$	\$963,600
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RECLAMATION COST BASIS

9/25/90

RIPPING

Parameters Used in Calculations for File No. *M/039/002*DETAILS/ASSUMPTIONS

- Caterpillar D9N dozer, 370hp, multishank ripper (3 tips)
- shank gauge 7'8" (tip to tip), pocket spacing 3'10" (between shanks)
- ASSUME width between passes $\sim 2.5'$ => overall pass width = 10'
- ASSUME ripping to 12" depth, average speed = 0.25 MPH, 1 MPH=88 FPM
- NOTE: ripping at 0.25 MPH => mtl with seismic velocity $\sim 4-5,000$ FPS
- one acre = 43,560 SF, use $\sim 400' \times 110'$ block
- ASSUME every 400' requires 0.30 min to raise, pivot, turn & lower
- ASSUME work efficiency of 50 minutes/hour

	DIST	SPEED	ADD	MIN/PASS
Time/Pass =(dist/speed)+ add on	400.00	0.25	0.30	18.48
		TIME		PASS/HR
#Pass/Hour = time/(MIN/PASS)		50.00		2.71
		FT/PASS		SF/PASS
Sq-ft Ripped/Pass =(length/pass)*(FT/PASS)		10.00		4000.00
				AC/PASS
Acre Ripped/Pass = (SF/PASS)/(SF/acre)				0.09
				AC/HR
Acre Ripped/Hr =(ACRE/PASS)*(PASS/HR)				0.25
				HRS/AC
Hrs to Rip one acre = 1 /(ACRE/HR)				4.03

FROM RENTAL RATE BLUE BOOK 4/90

	EQUIP	OPER	
Hourly Cost, semi-U (pg 9-136)	135.00	33.75	
Multi-shank rippers, 3 (pg 9-164)	<u>24.00</u>	<u>4.10</u>	
Sub-totals	159.00	37.85	
Mult by regional factor	<u>1.05</u>	<u>1.05</u>	
Sub-totals	166.95	39.74	
Sub-total Equipment & Operating Cost			206.69 (\$/HR)

FROM MEANS SITE WORK COST DATA 1990

Crew B-10M, 1-Equip Operator (med), hourly cost 30.68 (\$/HR)

TOTAL COST PER HOUR 237.37 (\$/HR)

TOTAL RIPPING COST PER ACRE 955.51 (\$/ACRE)

RECLAMATION COST BASIS

9/25/90

RIPPING

Parameters Used in Calculations for File No. *M/039/002*

DETAILS/ASSUMPTIONS

- Caterpillar D9N dozer, 370hp, multishank ripper (3 tips)
- shank gauge 7'8" (tip to tip), pocket spacing 3'10" (between shanks)
- ASSUME width between passes ~2.5' => overall pass width = 10'
- ASSUME ripping to 12" depth, average speed = 0.25 MPH, 1 MPH=88 FPM
- NOTE: ripping at 0.25 MPH => mtl with seismic velocity ~4-5,000 FPS
- one acre = 43,560 SF, use ~400' x 110' block
- ASSUME every 400' requires 0.30 min to raise, pivot, turn & lower
- ASSUME work efficiency of 50 minutes/hour

	DIST	SPEED	ADD	MIN/PASS
Time/Pass =(dist/speed)+ add on	400.00	0.30	0.30	15.45
		TIME		PASS/HR
#Pass/Hour = time/(MIN/PASS)		50.00		3.24
		FT/PASS		SF/PASS
Sq-ft Ripped/Pass =(length/pass)*(FT/PASS)		10.00		4000.00
				AC/PASS
Acre Ripped/Pass = (SF/PASS)/(SF/acre)				0.09
				AC/HR
Acre Ripped/Hr =(ACRE/PASS)*(PASS/HR)				0.30
				HRS/AC
Hrs to Rip one acre = 1 /(ACRE/HR)				3.37

FROM RENTAL RATE BLUE BOOK 4/90

	EQUIP	OPER	
Hourly Cost, semi-U (pg 9-136)	135.00	33.75	
Multi-shank rippers, 3 (pg 9-164)	<u>24.00</u>	<u>4.10</u>	
Sub-totals	159.00	37.85	
Mult by regional factor	<u>1.05</u>	<u>1.05</u>	
Sub-totals	166.95	39.74	
Sub-total Equipment & Operating Cost			206.69 (\$/HR)

FROM MEANS SITE WORK COST DATA 1990

Crew B-10M, 1-Equip Operator (med), hourly cost 30.68 (\$/HR)

TOTAL COST PER HOUR 237.37 (\$/HR)

TOTAL RIPPING COST PER ACRE 798.84 (\$/ACRE)

RECLAMATION COST BASIS

9/25/90

MTL REDISTRIB/GRADEWORK

Parameters Used in Calculations for File No.

M/039/002

DETAILS/ASSUMPTIONS

- Caterpillar D9N dozer, 370hp, universal blade, track type
- Info from Caterpillar Performance Handbook, edition 18, section 1-11
- Operator: Average, correction factor = 0.75
- Material: ASSUME Loose Stockpile, correction factor = 1.20
- Slot Dozing: factor = 1.20; Visibility: excellent, factor = 1.0
- Job Efficiency: 50min/hr, factor = 0.83; Direct Drive Trans: factor = 0.80
- Mtl Weight: ASSUME 2550 LB/CY, factor = 2300/2550 = 0.90
- Grade: ASSUME +5%, factor = 0.90
- Distance: ASSUME 200 ft average push

=> Sec. 1-11, pg 58, Uncorrected Max Production					700.00 (LCY/HR)
Correction Factors shown above	0.75	1.20	1.20	1.20	
	1.00	0.83	0.80	0.90	
	0.90				
Overall Correction Factor =		0.70			
Est Production = Max Production * Correction Factor					487.93 (CY/HR)

FROM RENTAL RATE BLUE BOOK 4/90

	EQUIP	OPER	
Hourly Cost, semi-U (pg 9-136)	135.00	33.75	
Mult by regional factor	<u>1.05</u>	<u>1.05</u>	
Sub-totals	141.75	35.44	
Sub-total Equipment & Operating Cost			177.19 (\$/HR)

FROM MEANS SITE WORK COST DATA 1990

Crew B-10M, 1-Equip Operator (med), hourly cost	30.68 (\$/HR)
TOTAL COST PER HOUR	207.87 (\$/HR)

	AREA	DEPTH	VOL
-1.0 ft deep over one acre	43560.0	1.0	1613.3 (CY)
-1.5 ft deep over one acre	43560.0	1.5	2420.0 (CY)
-2.0 ft deep over one acre	43560.0	2.0	3226.7 (CY)

NOTE: Cost/Acre is dependent upon depth/acre (volume of mtl)

	(\$/ACRE)	(\$/CY)
COST/ACRE 1.0 FT DEEP	687.31	0.43
COST/ACRE 1.5 FT DEEP	1030.97	0.43
COST/ACRE 2.0 FT DEEP	1374.63	0.43

RECLAMATION COST BASIS

9/28/90

MTL REDISTRIB/GRADEWORK

Parameters Used in Calculations for File No.

M/039/002

DETAILS/ASSUMPTIONS

- Caterpillar D9N dozer, 370hp, universal blade, track type
- Info from Caterpillar Performance Handbook, edition 18, section 1-11
- Operator: Average, correction factor = 0.75
- Material: ASSUME Loose Stockpile, correction factor = 1.20
- Slot Dozing: factor = 1.20; Visibility: excellent, factor = 1.0
- Job Efficiency: 50min/hr, factor = 0.83; Direct Drive Trans: factor = 0.80
- Mtl Weight: ASSUME 2550 LB/CY, factor = 2300/2550 = 0.90
- Grade: ASSUME +5%, factor = 0.90
- Distance: ASSUME 100 ft average push

=> Sec. 1-11, pg 58, Uncorrected Max Production				1200.00 (LCY/HR)
Correction Factors shown above	0.75	1.20	1.20	1.20
	1.00	0.83	0.80	0.90
	0.90			
Overall Correction Factor =		0.70		
Est Production = Max Production * Correction Factor				836.45 (CY/HR)

FROM RENTAL RATE BLUE BOOK 4/90

	EQUIP	OPER	
Hourly Cost, semi-U (pg 9-136)	135.00	33.75	
Mult by regional factor	1.05	1.05	
Sub-totals	141.75	35.44	
Sub-total Equipment & Operating Cost			177.19 (\$/HR)

FROM MEANS SITE WORK COST DATA 1990

Crew B-10M, 1-Equip Operator (med), hourly cost	30.68 (\$/HR)
TOTAL COST PER HOUR	207.87 (\$/HR)

	AREA	DEPTH	VOL
-1.0 ft deep over one acre	43560.0	1.0	1613.3 (CY)
-1.5 ft deep over one acre	43560.0	1.5	2420.0 (CY)
-2.0 ft deep over one acre	43560.0	2.0	3226.7 (CY)

NOTE: Cost/Acre is dependent upon depth/acre (volume of mtl)

	(\$/ACRE)	(\$/CY)
COST/ACRE 1.0 FT DEEP	400.93	0.25
COST/ACRE 1.5 FT DEEP	601.40	0.25
COST/ACRE 2.0 FT DEEP	801.87	0.25